

## EVALUATION OF SODIUM BORATE FOR THE CONTROL OF NEMATODES AND WOOD-BORERS IN PINE LOGS

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International trade in unprocessed logs and other raw wood products presents a risk of introducing exotic pests into new habitats. To protect forested ecosystems in the United States, APHIS has proposed regulations regarding the importation of logs and lumber that depend strongly on methyl bromide fumigation as a mitigation procedure (59 FR 3002.3029, January 20, 1994). Methyl bromide, however, has been identified as an ozone depleting-substance. Therefore, if wood fiber is to continue to move globally, it is essential to develop alternatives for methyl bromide for managing pests in raw wood products. This research was undertaken to evaluate a chemical alternative, sodium borate, for controlling the pinewood nematode, Bursaphelenchus xylophilus, and its principal insect vectors, Monochamus spp. (sawyers; wood-borers), in pine logs.

The efficacy of dip-diffusion sodium borates treatments for eradicating nematodes and wood-borers in pine logs was tested in two experiments. In the first experiment, 40 30-cm-long by 12-cm-diameter debarked eastern white, slash and loblolly pine logs naturally-infested with pinewood nematodes and sawyers were dipped in 25 percent boric acid equivalent (BAE) solutions of TIM-BOR<sup>TM</sup> (sodium borate) and BORA-CARE<sup>TM</sup> (mixed glycols plus sodium borate) for 2 min at 55°C. Twenty additional logs served as controls. Also, 20 logs were fumigated with methyl bromide at the rate of 240 g/m<sup>3</sup>. In the second experiment, 40 loblolly pine logs (30-cm-long by 12-cm-diameter) logs were dipped in a 25 percent BAE solution (TIM-BOR<sup>TM</sup>) or water for 0, 2, 4, and 8 min at 55°C (five logs per treatment combination). In both experiments, nematode densities in the logs were determine before and after treatment using the Baermann funnel extraction technique. The logs were placed in an insectary and monitored for sawyer emergence. Distribution of boron in the wood was determined colormetrically.

Although nematode populations declined in the borate-treated logs, none of the sodium borate treatments approached eradicating the nematode. Also, there was no apparent relationship between time in the sodium borate solution and subsequent pinewood nematode densities in the wood. In both experiments, Monochamus adults emerged from the borate-treated and control logs. Boron was concentrated in the outer rings of the logs and in the walls of the wood-borer galleries. Nematodes and sawyers were not recovered from logs fumigated with methyl bromide.

In conclusion, dip-diffusion sodium borate treatments were not found to be effective in controlling xylem-inhabiting nematodes and wood-borers in pine logs.